Introduction: The Ambivalences of Abstraction
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Abstraction is a term that commonly carries negative connotations. So, for example, it is frequently opposed to lived experience – that is, abstraction is presented as a reduction of the richness and complexity of everyday life. In other negative uses, abstraction is held to involve an erasure of difference in a process of homogenization or generalization, as for example when the creation of classes or classifications of types denies the full expression of singular cases, individuality and particularity. Abstraction, it is claimed, is indifferent to the particular and therefore incapable of generating or promoting difference. If abstraction does generate difference, it does so, it is presumed, only in calculable terms, defined in relation to a fixed number of possibilities. Abstraction is also used negatively to indicate a preoccupied state of mind or to describe cognitive states, types of thoughts that are oblivious to events (as in abstract thought). Abstraction in these negative senses is always in need of specification, in more ways than one.

Rather than restricting abstraction to these negative uses (which paradoxically themselves often rely on the mode of abstraction they describe), this collection examines practices of abstraction rather than abstraction as such: that is, the collection is concerned with *the doing of abstraction*. This focus allows the authors to recognise abstraction as a characteristic of many everyday as well as scientific, technical and economic practices. And to do so without assuming that these practices refer to orders or levels of culture or society established *a priori*, while nonetheless pointing to the ways in which practices of abstraction are a means to organize and coordinate society. And while the authors consider whether and how such practices variously involve recognized characteristics of abstraction: detachment from or avoidance of representational qualities; identification and isolation of common features or attributes to create classifications, types or genres; processes of de- and re-contextualisation; practices of extraction; the pre-occupation of mind – they are also attentive to the ways in which practices of abstraction work with and against other specific, situated practices, and do so more or less successfully. A shared focus, then, is on the way in which practices of abstraction do not go uncontested, but must be accounted for, often as a product of concrete work which – ironically - itself may become an abstraction.

In the pages that follow, abstraction can be found in the Anthropocenic calls for a politicization of geophyisics (Tironi); in new forms of experience money such as Apple Pay and their relation to existing accounts of money (Tkacz); as a constitutive component in the ontology of social scientific methodology (Michael); as virtualities, both real and ideal but not actual (Shields); as central to innovation processes in mathematical and computational methods (Spencer); as a mode of thought that has consecutively distanced and domesticated 'nature' (Chandler); and in the performed behaviours of people enrolled in an electricity load experiment (Grandclement). This array of abstractions reminds us of a central irony of abstraction – that it is itself not easy to abstract.

If we try to abstract a version of abstraction that echoes across the papers (at least as a starting point), it might invoke generalization from the particular, and the allied bracketing of the specific and the situated, in order to derive (or reflect) categories of comparison. But this abstracted articulation of abstraction is too specific - it is too epistemological (Michael) or uncritical (Chandler). Moreover, it says little about the practices by which abstraction is attempted if not always accomplished. For instance, abstraction can be manifested through self-conscious performance (Grandclement, Tkacz, Spencer), or exemplified in the caricature of the geosciences that affords their critique (Tironi).

The contributions collected here show how the 'negative' abstraction of abstraction leaves open the multiple 'others' against which 'abstraction' is articulated. Put otherwise, a solely negative account avoids acknowledging what abstraction is a movement away from, what it is working against, the interrelations of abstraction and its others, not simply descriptively, but also speculatively, making it hard to explore how such inter-relations can be/are being revitalized (rather than reinforced). In contrast, our authors identify and describe the emergent involutions of abstraction and its others through, say, the production of liminal events (for example, Shields), or the composition of modes of care (Michael), or the promotion of a sort of 'hyper-abstraction' (for example, Chandler). In exploring the ambivalence of abstraction, in describing what abstraction works against, the authors highlight the interruptions, disturbances and glitches that emerge in the *movement* from the empirical to the formal, the particular to the general, and back. They recognize the ambivalences of abstraction and in doing so develop a more ambivalent relation to abstraction than a solely negative account will allow.

To further this concern with the ambivalence of abstraction, and drawing on the accounts the authors to this Special Issue raise, we list a short series of basic questions to ask of abstraction: When, where and how does abstraction take place? What are the practices and means by which abstraction is attempted or accomplished? On what do these practices or means work? In other words, what are the (specific) 'others' of this (specific) abstraction? What does abstraction 'do'? In what way is abstraction productive or positive, negating or negative? What are the qualities of abstraction? What resists abstraction? Can abstraction itself be a mode of resistance? What are the emergent, or ambiguous, relations between abstraction and its others? How might these be enhanced, better involuted, and rendered 'positive'? And in what does that 'positivity' consist? To be sure these are simple questions, but they might together serve as a prompt to a more expansive and elaborated list. Such a list, we hope, would invite a more pronounced circumspection over our own respective uses – and practices - of abstraction. Ideally it resources a collective recognition that abstraction is itself an abstraction, even if that recognition also entails something of the negative and positive qualities of the abstract.